PERFORMANCE OF THE JEFFERSON COUNTY, TEXAS SECTION 227 SHORELINE EROSION CONTROL DEMONSTRATION PROJECT

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The northeast Texas Gulf shore between Sabine Pass and Rollover Pass is divided into two morphocompositional units. The easternmost section is a chenier plain that is characterized by a broad salt marsh with a muddy substrate. West of the chenier plain, the shore is a headland composed of late Pleistocene fluvial-deltaic deposits. Headland beaches in this reach are narrow and steep and composed of mud or a thin veneer of fine sand and shell over mud. Modern sand supply is negligible along the beaches of east Texas. Sand-size particles transported by the Sabine River are deposited as bay-head delta deposits in Sabine Lake and are not available to the coastal littoral system. The Sabine Pass jetties effectively block transport of any coarse-grain material that might be available in the regional littoral system. Storms erode the thin layer of sand, exposing the mud to further erosion. During storms, beach sediment that is not pulled offshore may be washed over the low-laying dune and deposited in the wetland area landward of the beach. Overwashed sediment is not recovered from the wetland. The beach profile has limited post-storm recovery due to a deficit of sediment in the littoral system. As a consequence, narrow beaches in this reach are generally retreating at a rate of approximately 5 ft, annually. Mitigation of the erosion has been considered in the form of minimal beach nourishment and dune construction. Experimental low-volume beach nourishment templates contained by geotextile tube groin cells were constructed along with a dune as part of the Corps of Engineers Section 227 National Shoreline Erosion Control and Demonstration Program.

The primary objectives of the project are to minimize erosion of the exposed cohesive sediment and to minimize sand overwash. The 2,500 ft long dune is designed to withstand a 5-year return period storm. Half of the dune is composed entirely of sand and half was constructed with a clay core. Fronting half of the engineered dune corridor is beach nourishment divided into four experimental cells of varying fill volume and grain size. The objective of the nourishment is to investigate the longevity of minimal fill volumes (6 and 12 yd^3/ft) composed of native beach sand ($0.17 \text{ mm} < d_{50} < 0.21 \text{ mm}$) or sand larger than what is naturally present on the active beach profile ($0.31 \text{ mm} < d_{50} < 0.40 \text{ mm}$). A geotextile tube groin separates each experimental cell. The function of the tube is to only contain the experimental areas.

The project has been monitored with cross-shore beach profiles, aerial photography, sediment samples, wave and water level measurements, and structure inspection. The tropical cyclone Ivan impacted the study area twice during September 2004. On September 16, Hurricane Ivan made landfall in Alabama and the project site was subject to elevated water levels and waves heights in excess of 12 ft. On 24 September, Tropical Storm Ivan again made landfall at the Louisiana/Texas border and impacted the project location. Pre- and post-storm profiles were collected as well as visual inspection of the dunes. Both events produced berm erosion, cross-shore transport and offshore bar development. Sand-cored dune segments exhibited erosion beyond the dune crest while erosion of the clay-cored dune segments was limited to minor sand removal at the toe of the dune. The monitoring data will be analyzed and the performance of the project evaluated.

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